FieldPoint™

cFP-20*xx* Quick Start Guide

What You Need to Get Set Up

- cFP-20*xx* LabVIEW RT controller
- Mounting hardware (DIN rail, panel-mount, or rack-mount accessory)
- I/O module(s)
- cFP-BP-*x* backplane, connector blocks, cables
- 11–30 V power supply
- Accessories: Ethernet cable, number 2 Phillips screwdriver
- PC running Windows
- FieldPoint software 3.0.2 or later
- LabVIEW RT

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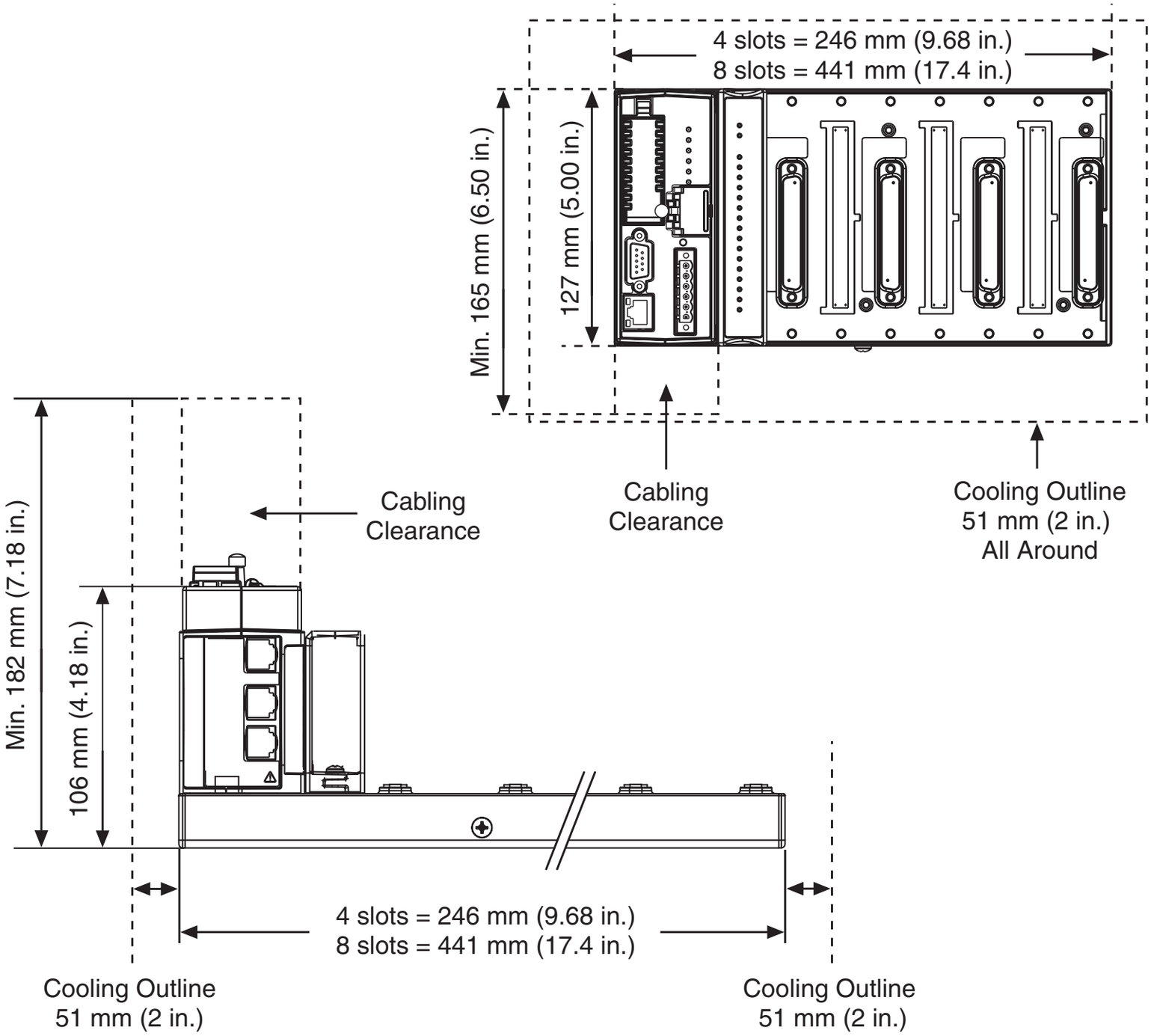
1 Mount the Compact FieldPoint Backplane

You can mount the cFP-BP-*x* backplane on a 35 mm DIN rail, on a panel, or in a standard 19 in. rack. Before using any of these mounting methods, record the serial number from the back of the backplane.

Each set of mounting instructions in this document includes an instruction to connect the protective earth (PE) ground terminal on the cFP-BP-*x* backplane to the system safety ground. The backplane PE ground terminal has the following symbol stamped beside it: ⏚. Connect the backplane PE ground terminal to the system safety ground using 14 AWG (1.6 mm) wire with a ring lug. Use the 5/16 in. panhead screw shipped with the backplane to secure the ring lug to the backplane PE ground terminal.

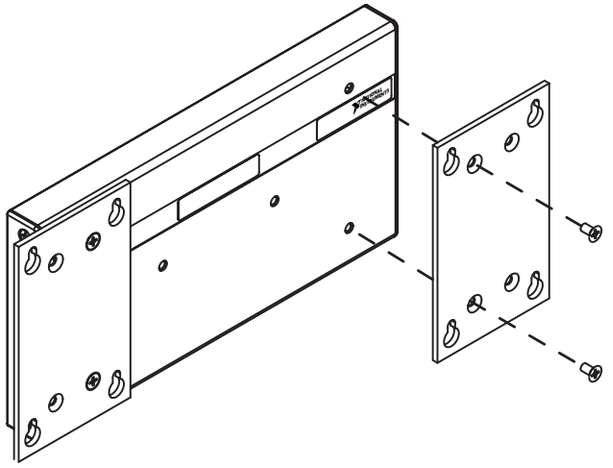
CAUTION Keep in mind these requirements for space and cabling clearance:

- Allow at least 51 mm (2 in.) all around the backplane for air circulation.
- Allow 38 mm (1.5 in.) below and 51 mm (2 in.) above the controller for cabling clearance.

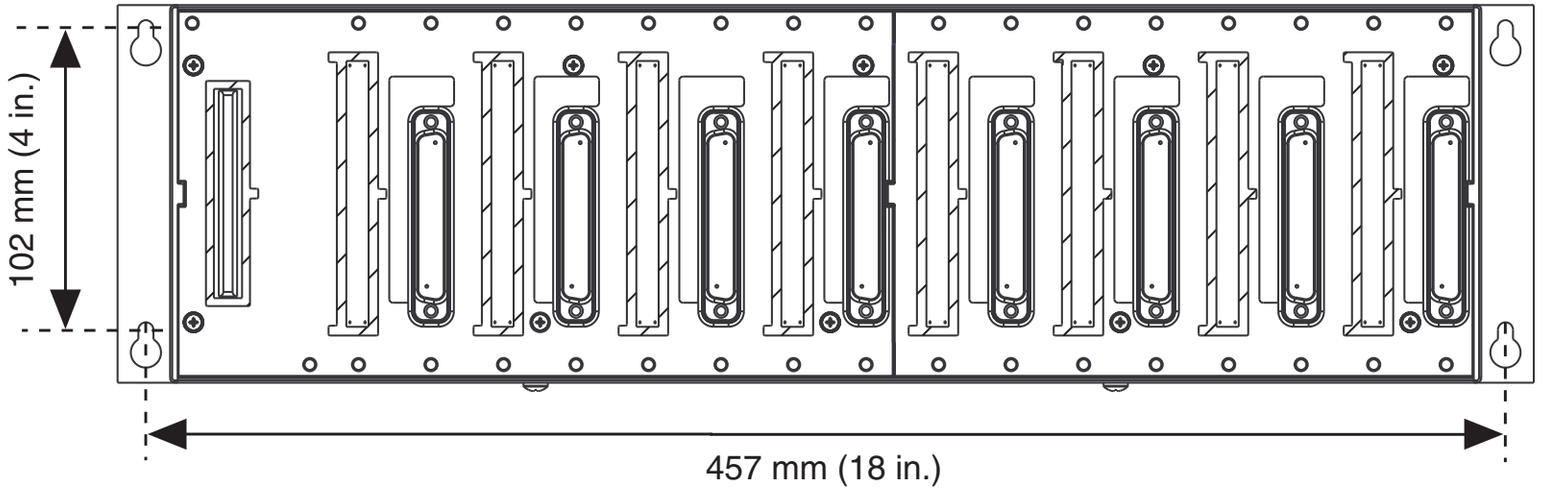

4 slots = 246 mm (9.68 in.)
8 slots = 441 mm (17.4 in.)
Min. 165 mm (6.50 in.)
127 mm (5.00 in.)
Cabling Clearance
Cabling Clearance
Cooling Outline 51 mm (2 in.) All Around
Min. 182 mm (7.18 in.)
106 mm (4.18 in.)
4 slots = 246 mm (9.68 in.)
8 slots = 441 mm (17.4 in.)
Cooling Outline 51 mm (2 in.)
Cooling Outline 51 mm (2 in.)

Mounting the Backplane on a Panel

A. Fasten the panel-mount plates to the back of the cFP-BP-*x* using a number 2 Phillips screwdriver and the 8-32 × 5/16 in. countersink screws shipped with the kit.

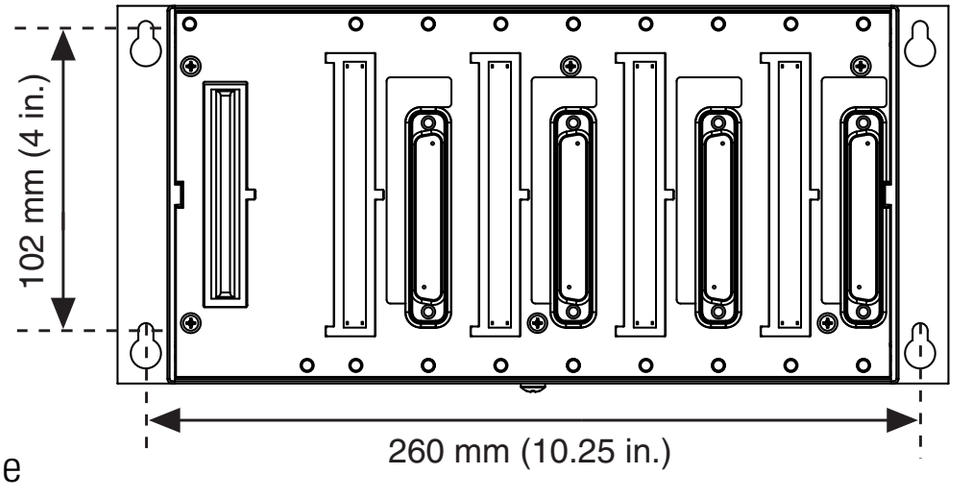


CAUTION Do not use screws longer than 5/16 in. to fasten the panel-mount plates to the backplane.



B. Bolt or screw the panel-mount accessory to a panel.

C. Connect the PE ground terminal on the cFP-BP-*x* to safety ground.

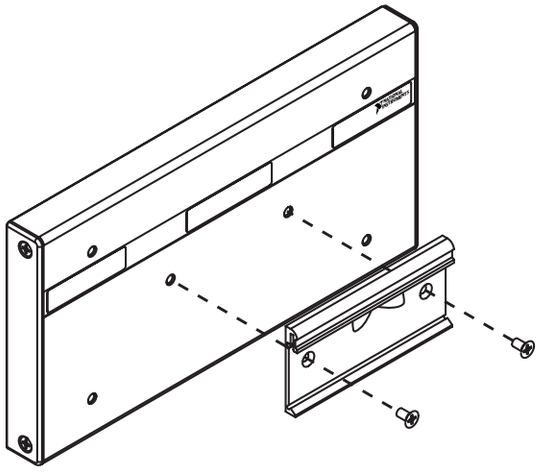


CAUTION Disconnect power before removing the backplane from the panel.

Mounting the Backplane on a DIN Rail

NI recommends DIN rail mounting for the cFP-BP-4 only. Use panel mounting or rack mounting for the cFP-BP-8.

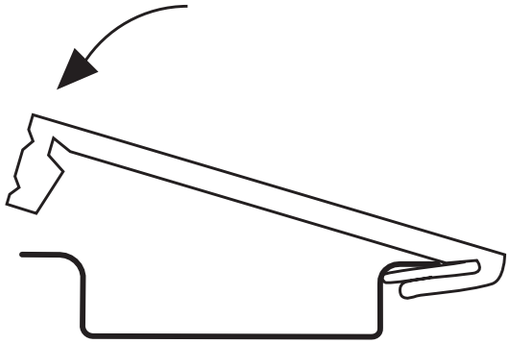
A. Fasten the DIN rail clip(s) to the cFP-BP-*x* using a number 2 Phillips screwdriver and the 8-32 × 5/16 in. countersink screws shipped with the clip(s).



CAUTION Do not use screws longer than 5/16 in. to fasten the DIN rail clip to the backplane.

B. Insert one edge of the DIN rail into the deeper opening of the DIN rail clip.

C. Press down firmly on the backplane to compress the spring until the clip locks in place on the DIN rail.

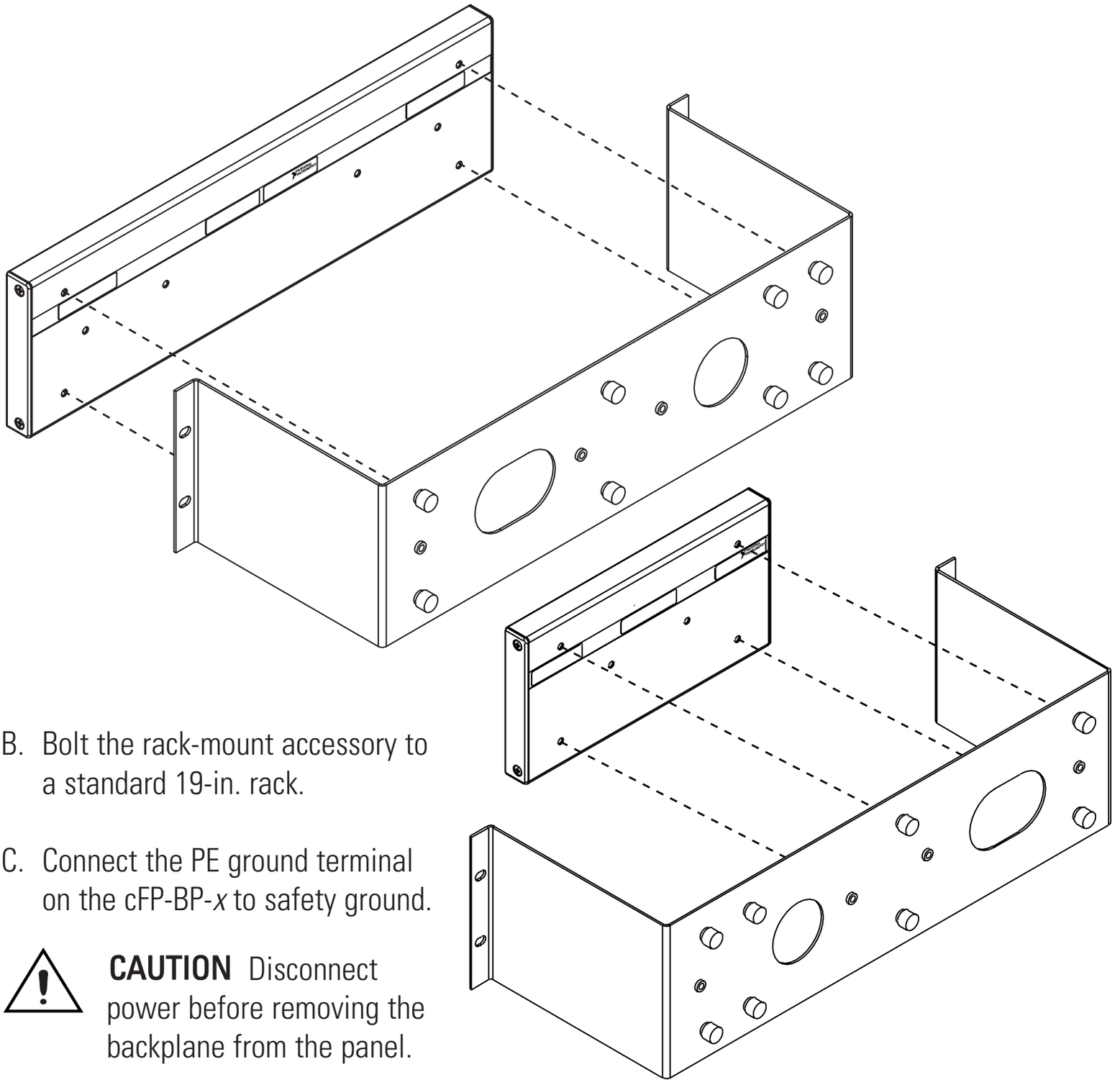


D. Connect the PE ground terminal on the cFP-BP-*x* to safety ground.

CAUTION Disconnect power before removing the backplane from the DIN rail.

Mounting the Backplane in a Standard 19-in. Rack

A. Fasten the rack-mount bracket to the back of the cFP-BP-*x* using the captive screws on the bracket.



B. Bolt the rack-mount accessory to a standard 19-in. rack.

C. Connect the PE ground terminal on the cFP-BP-*x* to safety ground.

CAUTION Disconnect power before removing the backplane from the panel.

2 Install the cFP-20*xx* Controller on the Backplane

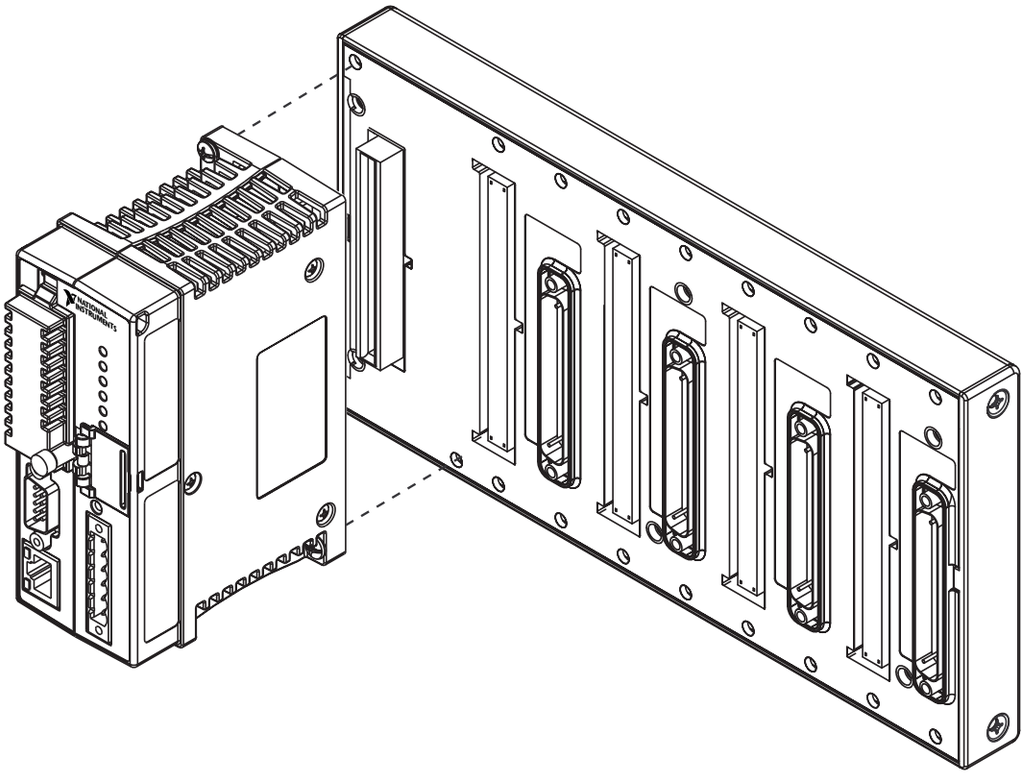
A. Make sure that no power is connected to the controller or the backplane.

B. Make sure that the cFP-20*xx* controller is right side up with the NI logo at the top, and align the captive screws on the controller with the holes on the backplane.

C. Seat the card edge at the back of the controller in the card-edge connector on the backplane.

D. Press the controller firmly to seat it on the backplane.

E. Using a number 2 Phillips screwdriver with a shank of at least 64 mm (2.5 in.) length, tighten the captive screws to 1.1 N · m (10 lb · in.) of torque.



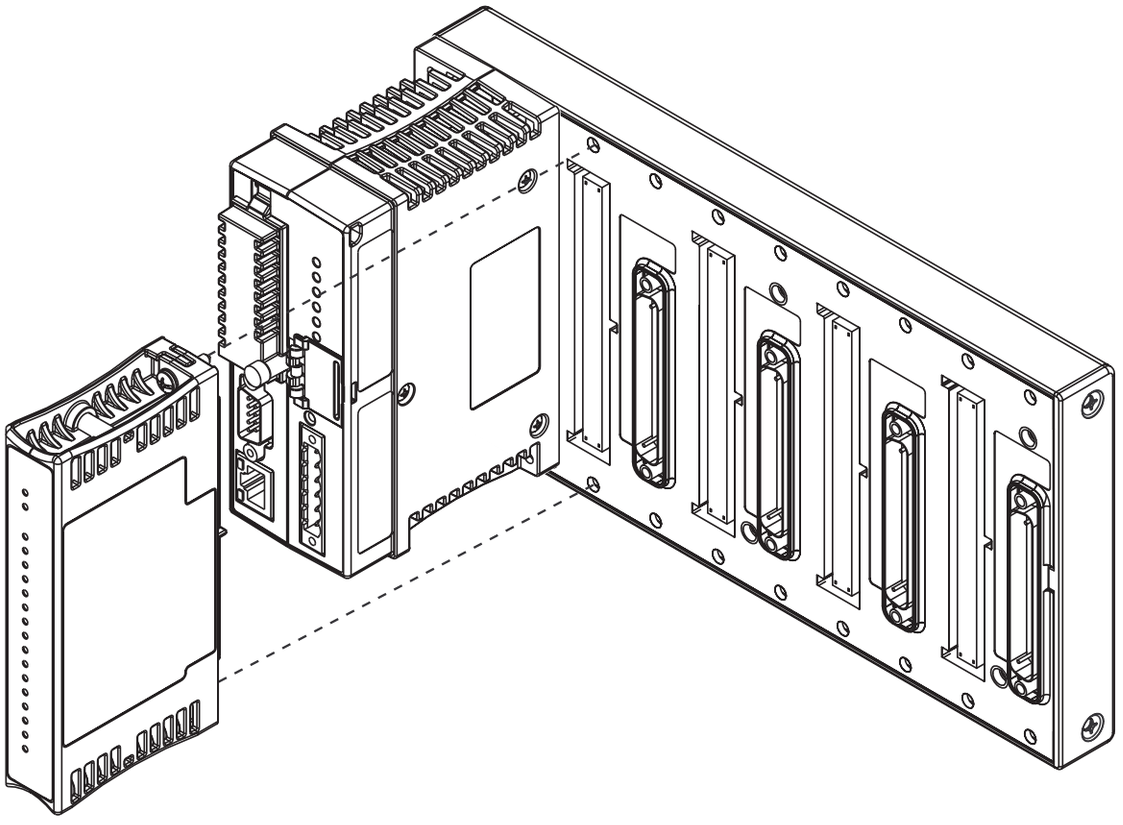
3 Install I/O Modules on the Backplane

A. Align the captive screws on the I/O module with the holes on the backplane.

B. Press firmly to seat the I/O module on the backplane.

C. Using a number 2 Phillips screwdriver with a shank of at least 64 mm (2.5 in.) length, tighten the captive screws to 1.1 N · m (10 lb · in.) of torque.

D. Repeat this procedure to install additional I/O modules on the backplane.



4 Install Connector Blocks on the Backplane

In order to connect I/O modules to input signals or to external loads, you need to install a cFP-CB-*x* connector block or other connectivity accessory for each I/O module on the backplane. Use the connector socket to the right of each I/O module socket.

CAUTION Do not insert or remove connector blocks or other connectivity accessories while power is applied to them.

A. Wire field devices as described in the I/O module and connector block operating instructions.

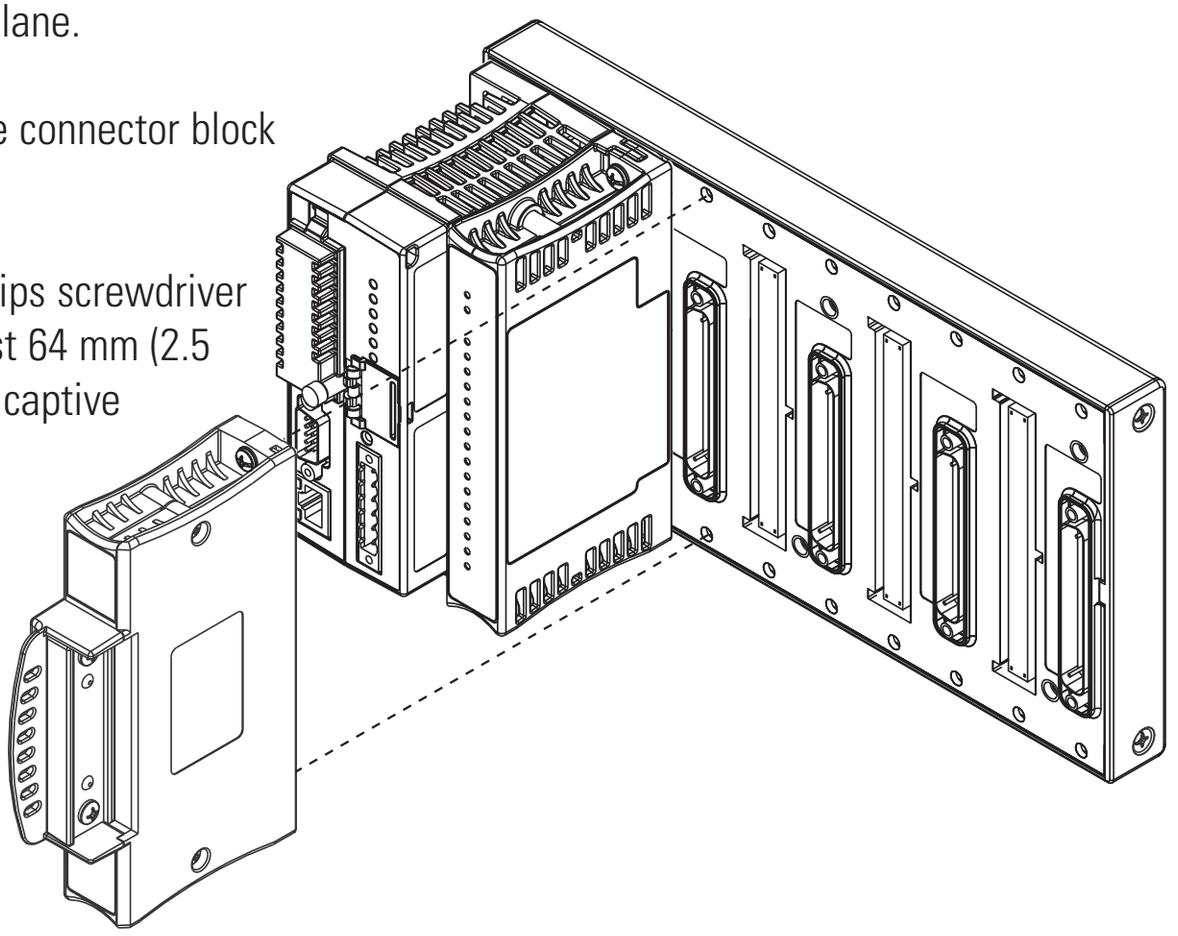
CAUTION Hazardous voltage wiring should be performed by qualified personnel and in accordance with local electrical standards.

B. Align the captive screws on the connector block with the holes on the backplane.

C. Press firmly to seat the connector block on the backplane.

D. Using a number 2 Phillips screwdriver with a shank of at least 64 mm (2.5 in.) length, tighten the captive screws to 1.1 N · m (10 lb · in.) of torque.

E. Repeat this procedure to install additional connector blocks on the backplane.



5 Connect the cFP-20*xx* to Your Network

Connect the cFP-20*xx* controller to an Ethernet network using the RJ-45 Ethernet port on the controller. Use a standard Category 5 Ethernet cable to connect the cFP-20*xx* to an Ethernet hub, or use an Ethernet crossover cable to connect the controller directly to a computer.

CAUTION To prevent data loss and to maintain the integrity of your Ethernet installation, do not use a cable longer than 100 m. If you are using a 100 Mbps Ethernet, National Instruments recommends using a Category 5 shielded twisted-pair Ethernet cable.

If the host PC is already configured on a network, you must configure the cFP-20*xx* on the same network. If neither is connected to a network, you can connect the two directly using a crossover cable.

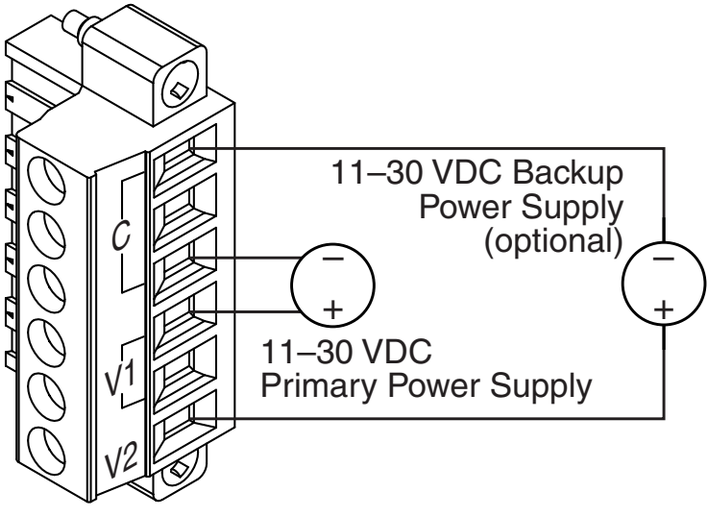
In order to configure the cFP-20*xx*, it must reside on the same subnet as the host PC. If you want to use the cFP-20*xx* on a subnet other than the one the host PC is on, first connect and configure it on the same subnet as the host PC, then reassign a static IP address for the subnet where you want it to be and physically move it to the other subnet.

6 Wire Power to the Compact FieldPoint System

Each cFP-20*xx* on your network requires an 11–30 VDC power supply.

A. Connect the positive lead of the primary power supply to one of the V1 terminals and the negative lead to one of the C terminals.

B. If you are using a backup power supply, connect the positive lead to V2 and the negative lead to one of the C terminals. The cFP-20*xx* uses the power supply with the higher voltage level. V2 is isolated from the other V terminals.



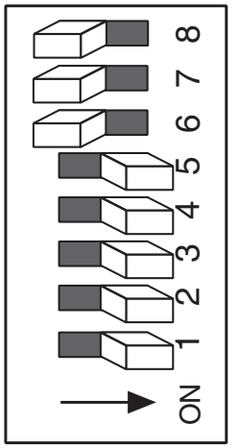
C. Use a separate power supply for each module that needs external power.

CAUTION Cascading power defeats isolation between the cascaded modules.

D. Refer to the operating instructions for the power requirements of each I/O module. If a module requires external power, connect a power supply to the V and C inputs on the connector block for that module. If you want to power field I/O devices from a connector block, supply power to the connector block, and then connect the connector block V and C output terminals to the field device.

7 Powering Up the cFP-20*xx*

Check the DIP switches on the controller, making sure that the RESET IP switch is not enabled. Plug in each power supply to the Compact FieldPoint system. The cFP-20*xx* runs a power-on self test (POST) that takes several seconds. You should see the POWER and STATUS LEDs come on. After about five seconds, the STATUS LED begins flashing. The cFP-20*xx* is ready to be configured, and you can install the FieldPoint software.



DIP Switches	Functions
1, 2	User-configurable on cFP-2000 and cFP-2010; disabled on cFP-2020
3, 4, 5	User-configurable
6	DISABLE VI
7	SAFE MODE
8	RESET IP

If you have already assigned an IP address to the cFP-20*xx,* the STATUS LED turns off, and the A, B, C, and D LEDs come on for about 15 seconds as LabVIEW RT starts up. Once they turn off, the I/O module READY LEDs come on, and the cFP-20*xx* is ready for use. The total boot time for a configured system is 30–45 seconds.

If the STATUS LED does not light up as described here, refer to the *cFP-20xx and cFP-BP-x User Manual.*

8 Install Software on the Host PC

A. Install the software packages you plan to use, such as LabVIEW, LabVIEW RT, Lookout, Measurement Studio, or LabWindows/CVI, before you install the FieldPoint software. The FieldPoint software installation installs the LabVIEW VIs and examples, Lookout driver class, and LabWindows/CVI instrument driver only if it finds the corresponding development software installed.

B. Close all other applications.

C. Insert the FieldPoint software CD into the CD-ROM drive on your computer.

D. Follow the onscreen instructions to complete the installation.

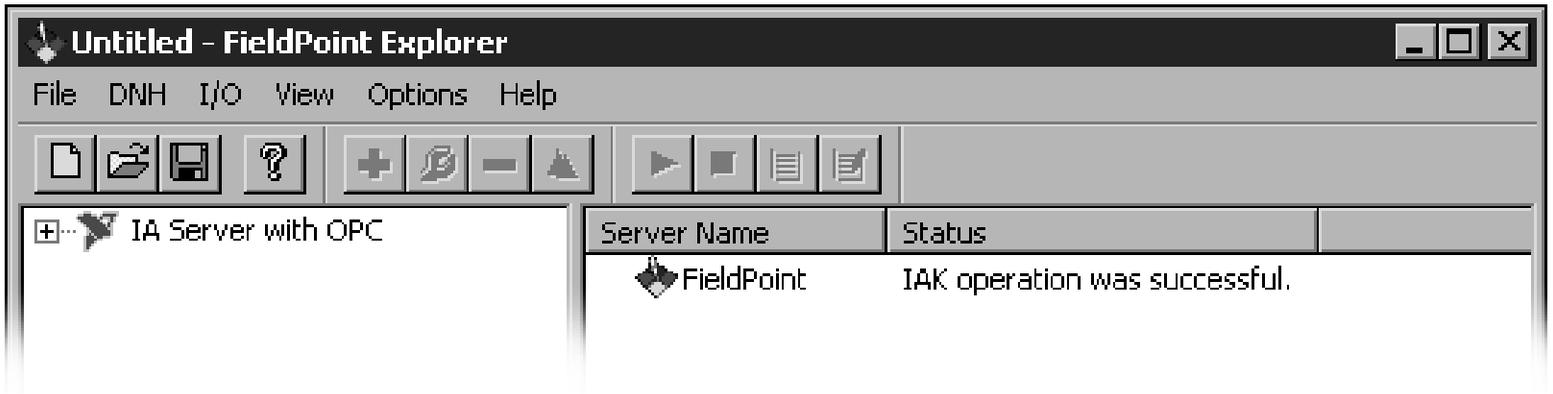
NOTE If the setup does not launch automatically, select **Start»Run** from Windows, enter `d:\setup`, where `d` is the letter of your CD-ROM drive, and select **OK**.

9 Configure the cFP-20*xx* in FieldPoint Explorer

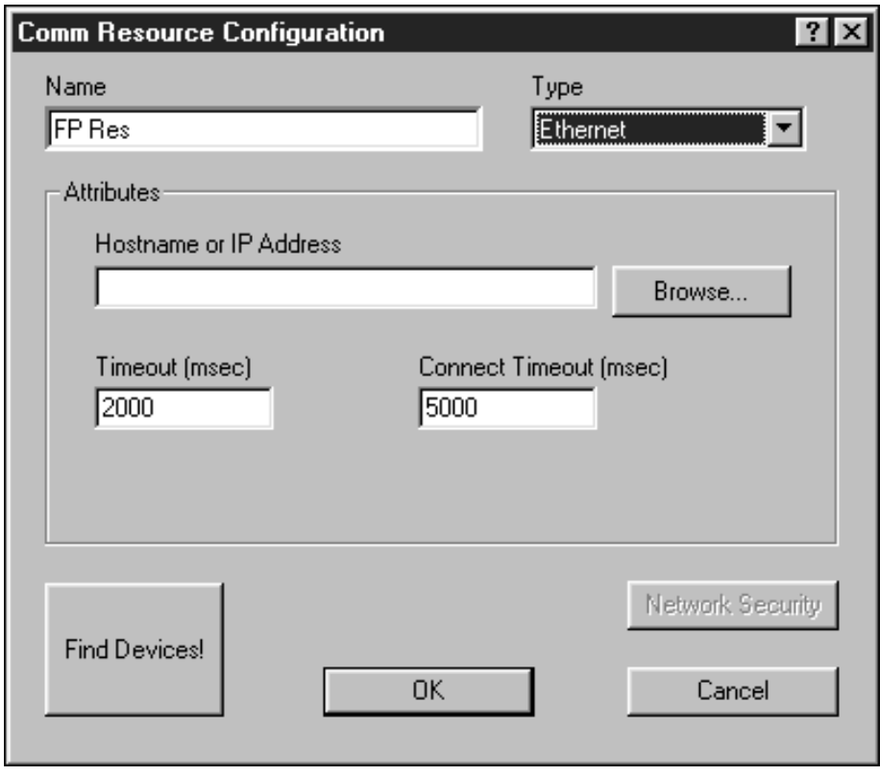
If you do not have version 3.0.2 or later of FieldPoint Explorer, download the current version from `ni.com` and install it on the PC.

A. Verify that the Compact FieldPoint system is powered on.

B. From the Windows Start menu, select **Programs»National Instruments FieldPoint»FieldPoint Explorer** to launch FieldPoint Explorer, shown in the following figure.

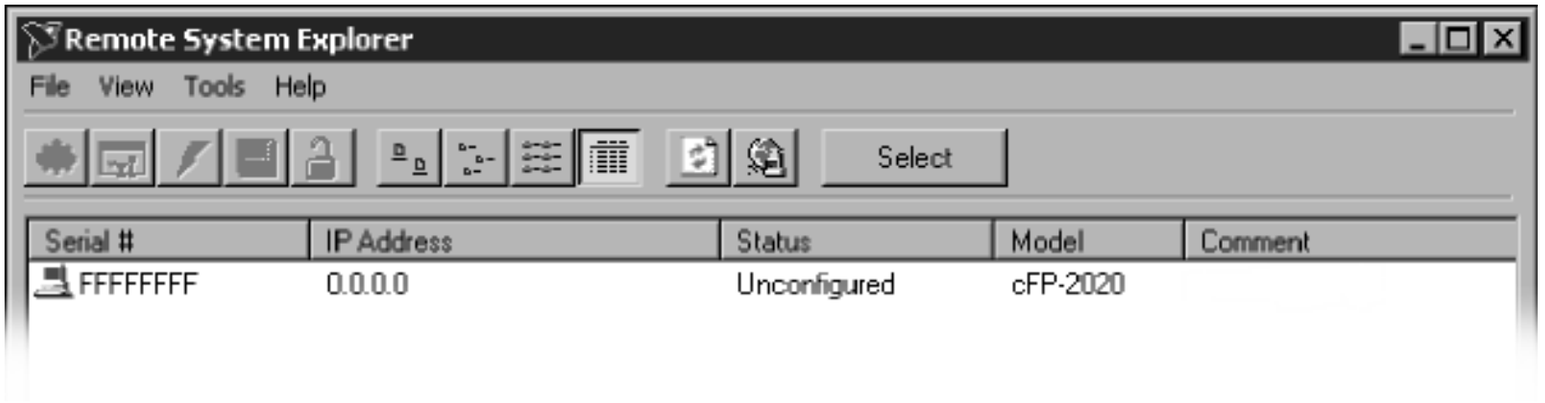


C. Click the **+** sign next to **IA Server with OPC** in the left pane to expand the view. Right-click **FieldPoint** and select **Add a comm resource to this server**. The Comm Resource Configuration dialog box appears.



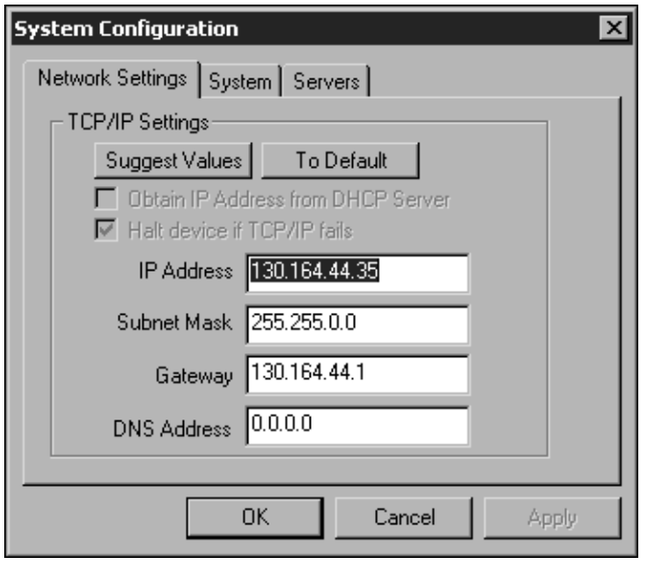
D. Set the Type to **Ethernet**, as shown in the figure to the right. Each Ethernet comm resource represents a single FieldPoint network module on the network.

E. Click **Browse** to launch Remote System Explorer. Remote System Explorer searches for any cFP-20*xx* or other National Instruments Ethernet devices on the subnet.



F. Double-click the serial number of the cFP-20*xx* you want to configure. Alternatively, you can right-click the controller and choose **Configure Device**.

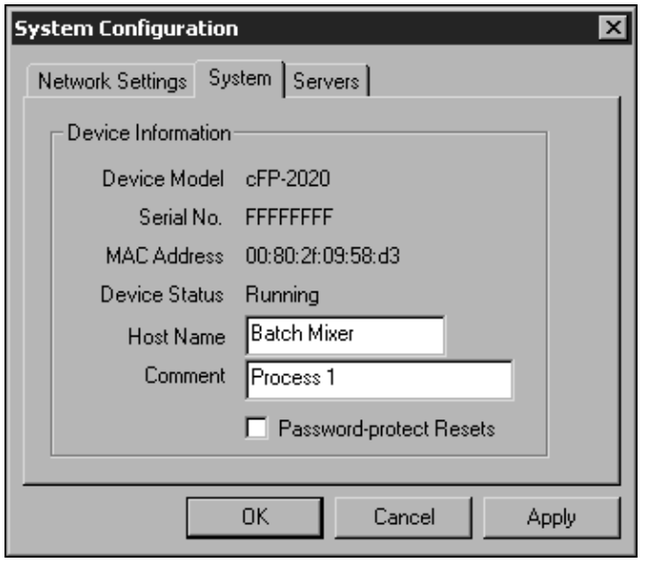
G. Enter values on the Network Settings tab of the System Configuration dialog box, shown in the figure at right. If your network does not have a gateway server or DNS server, you should set those parameters to 0.0.0.0.



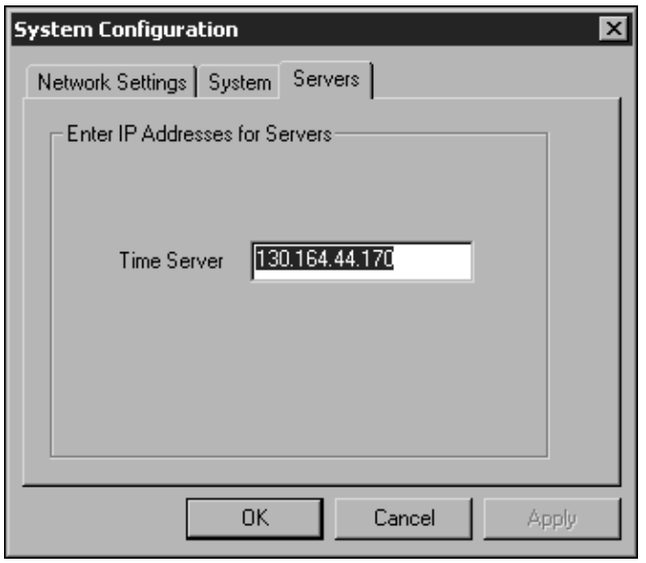
- **IP Address**—The unique, computer-readable address of a device on your network. An IP address is typically represented as four numbers separated by periods (for example, 130.164.55.112), where the numbers can be between 0 and 255, inclusive.
- **Subnet Mask**—A code that helps the network device determine whether another device is on the same subnet or a different subnet. The most common subnet mask is 255.255.255.0.
- **Gateway**—The IP address of a device that acts as a gateway server, which is a connection between two networks.
- **DNS Address**—The IP address of a network device that stores host names and translates them into IP addresses.

H. Enter values on the System tab of the System Configuration dialog box.

- **Host Name**—Can describe the physical location of the system or the application where it is being used.
- **Comment**—Helps to identify the controller.
- **Password-protect Resets**—Determines whether users are allowed to reset the Compact FieldPoint system remotely. If this checkbox is selected, a user must provide the password in order to reset the system remotely. You must disable resets from FieldPoint Explorer separately by setting user access to Read Only or Deny Access.



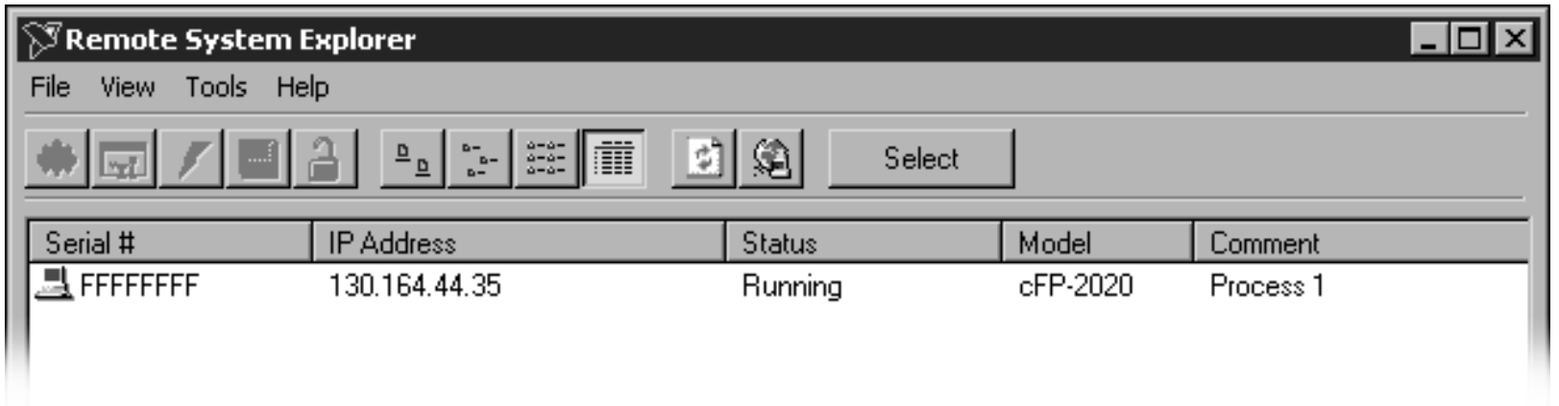
I. Enter an IP address for the Time Server on the Servers tab of the System Configuration dialog box, shown in the figure at right.



The time server is a networked computer that runs the National Instruments Time Service installed by FieldPoint Explorer. Enter the IP address of the PC you are using. When you finish configuring the controller, the time has been set and Time Server is not a required parameter. The cFP-20*xx* has an internal battery-backed clock that provides consistent timestamps in the absence of a time server.

J. Click **OK** in the System Configuration dialog box. Click **Yes** when prompted to reboot the cFP-20*xx*.

When the cFP-20*xx* reboots, it should appear in Remote System Explorer with the updated IP address and comment, as shown in the following figure. If it does not appear, select **View»Refresh** or refer to the user manual.



K. Highlight the serial number and click **Select**. When the new host name or IP address appears in the Comm Resource Configuration dialog box of FieldPoint Explorer, you can configure your devices and channels.

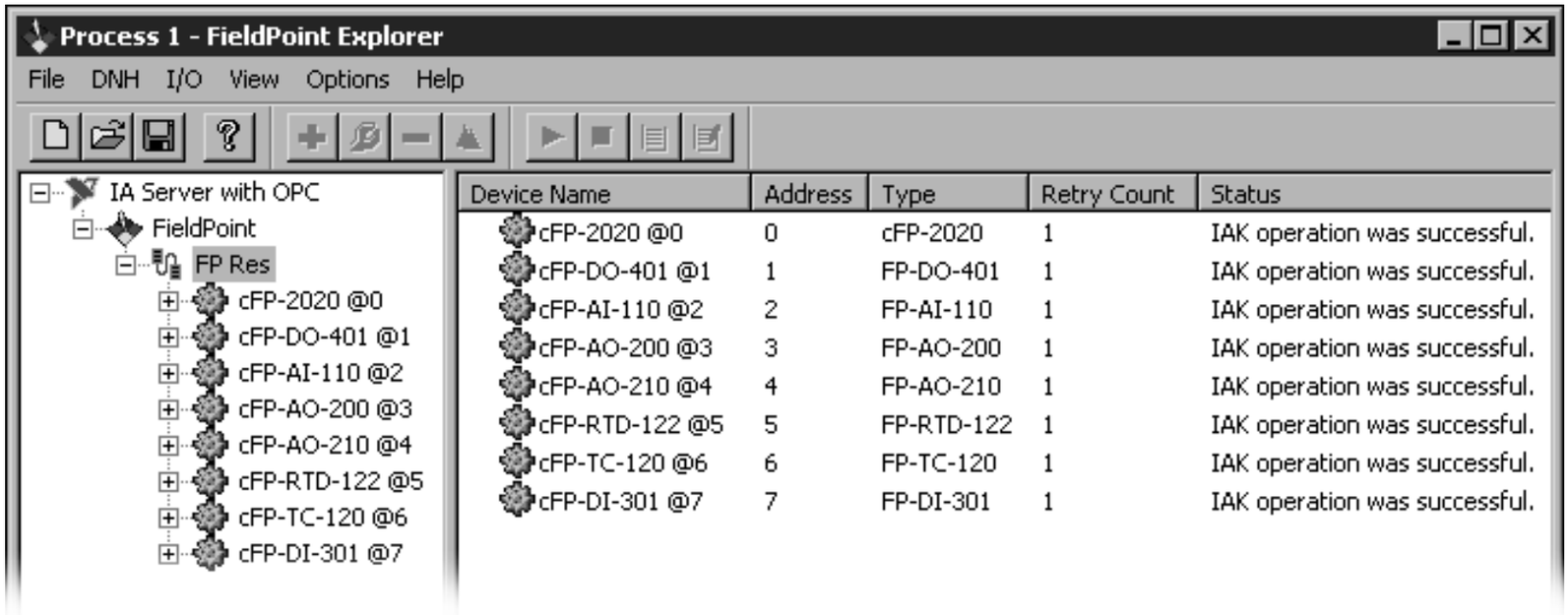
10 Finding and Configuring Devices and Channels

After you have configured the cFP-20*xx* in FieldPoint Explorer, follow these steps to configure Compact FieldPoint devices and channels.

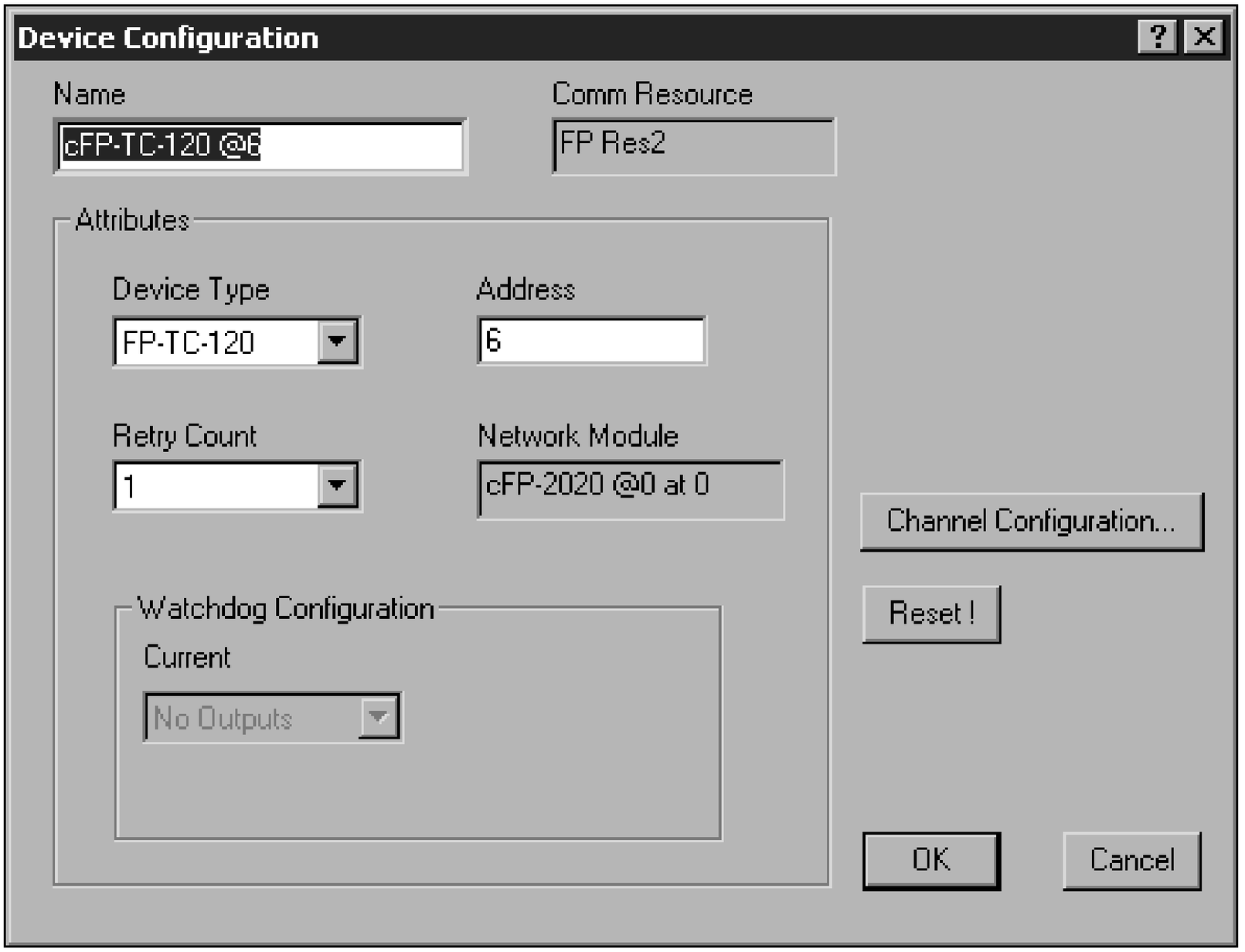
A. In the Comm Resource Configuration dialog box, click **Find Devices** to search for all of the devices connected to the cFP-20*xx*. If the Comm Resource Configuration dialog box is not already open, right-click the cFP-20*xx* in FieldPoint Explorer and select **Edit this comm resource**.

   If FieldPoint Explorer finds no devices, refer to the user manual.

B. After FieldPoint Explorer finds the Compact FieldPoint modules, click the **+** sign next to **FP Res** in the left pane to expand the device hierarchy and display the modules found on the network.


Process 1 - FieldPoint Explorer
File DNH I/O View Options Help
IA Server with OPC
FieldPoint
FP Res
cFP-2020 @0
cFP-DO-401 @1
cFP-AI-110 @2
cFP-AO-200 @3
cFP-AO-210 @4
cFP-RTD-122 @5
cFP-TC-120 @6
cFP-DI-301 @7
Device Name Address Type Retry Count Status
cFP-2020 @0 0 cFP-2020 1 IAK operation was successful.
cFP-DO-401 @1 1 FP-DO-401 1 IAK operation was successful.
cFP-AI-110 @2 2 FP-AI-110 1 IAK operation was successful.
cFP-AO-200 @3 3 FP-AO-200 1 IAK operation was successful.
cFP-AO-210 @4 4 FP-AO-210 1 IAK operation was successful.
cFP-RTD-122 @5 5 FP-RTD-122 1 IAK operation was successful.
cFP-TC-120 @6 6 FP-TC-120 1 IAK operation was successful.
cFP-DI-301 @7 7 FP-DI-301 1 IAK operation was successful.

   The hierarchy includes all of the modules connected to the cFP-20*xx*. The default name of each device found includes the name of the FieldPoint module, followed by a space, the @ sign, and the address of the module (for example, cFP-2000 @0). For each module found, one I/O Item is created for each channel on the module, and if all the channels are of the same type, one I/O Item is created to represent all the channels on that module collectively.



C. To configure the hardware settings of a particular I/O module, right-click the device name and select **Edit this device**. The Device Configuration dialog box appears, as shown in the figure above.

For output modules, you can choose settings for Watchdog Configuration. Refer to the user manual for information about the network watchdog feature.

D. Click **Channel Configuration** to access the Channel Configuration dialog box, shown in the figure at right.

NOTE Configuration options vary by module. The options listed here may not be available for some modules.

Make your selections in this dialog box as follows:

1. Select the type of channel to show, then select the channel(s) that you want to change. To select more than one channel, clear the **One channel at a time** checkbox.

2. Set the range and output values of the selected channel(s).

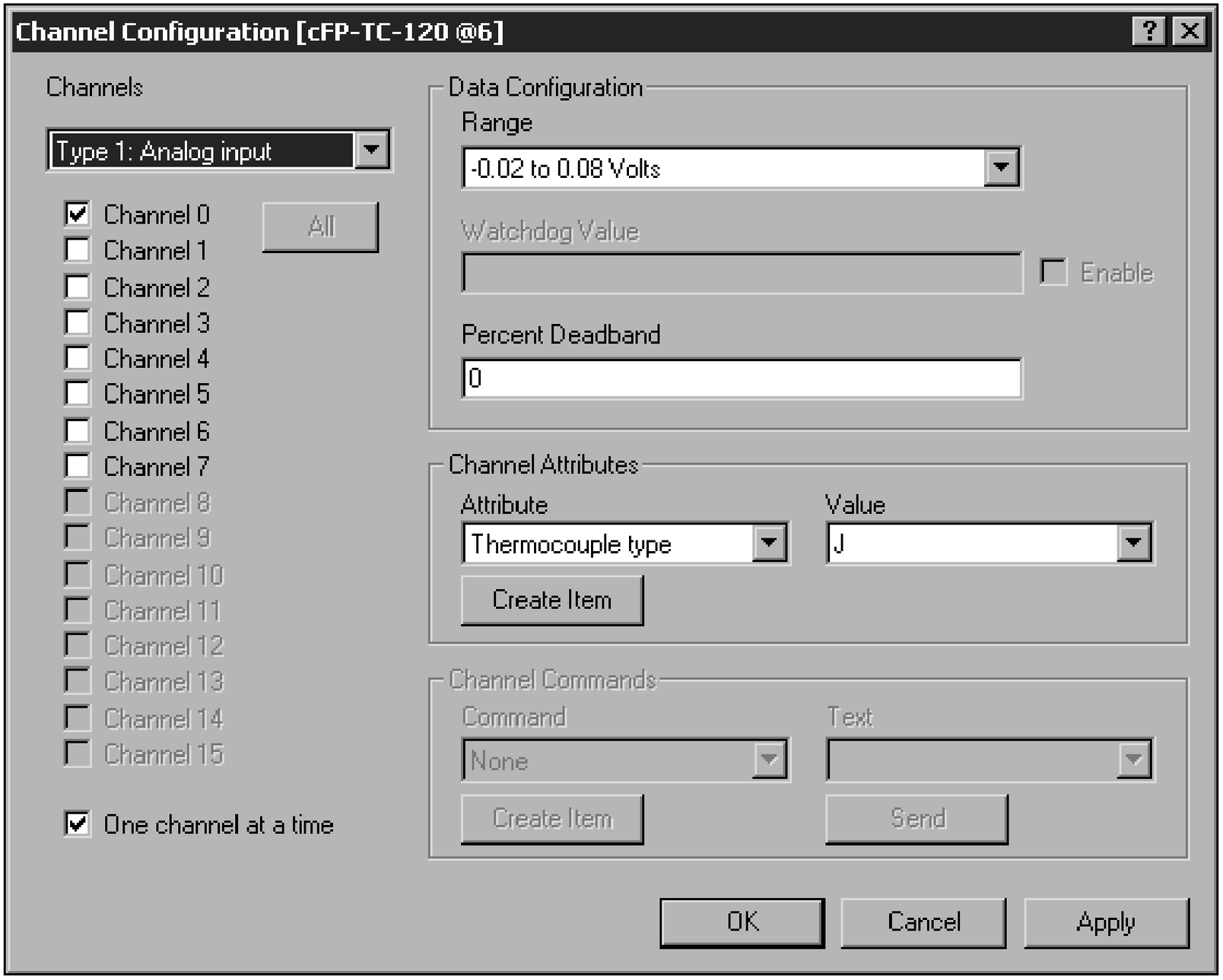
3. Set the deadband for data communication over the network. The deadband setting is a percentage of the full-scale range.

4. Set attributes for selected channel(s) by selecting the attribute and entering the desired value.

5. Send commands to the selected channel(s) by choosing a command and value and clicking **Send**.

6. Repeat this procedure for each channel you want to configure.

7. Click **OK**, or click **Apply** to save the changes and continue to configure channels. When you click **OK** or **Apply**, the changes are immediately sent to the device and saved in its nonvolatile memory.


Channel Configuration [cFP-TC-120 @6]
Channels
Type 1: Analog input
Channel 0
Channel 1
Channel 2
Channel 3
Channel 4
Channel 5
Channel 6
Channel 7
Channel 8
Channel 9
Channel 10
Channel 11
Channel 12
Channel 13
Channel 14
Channel 15
All
One channel at a time
Data Configuration
Range
-0.02 to 0.08 Volts
Watchdog Value
Enable
Percent Deadband
0
Channel Attributes
Attribute
Thermocouple type
Value
J
Create Item
Channel Commands
Command
None
Text
Create Item
Send
OK
Cancel
Apply

11 Saving Hardware Configuration as Power-Up State

When you are satisfied with the hardware configuration of the FieldPoint system, you can save this configuration as the new power-up state for the system.

A. Right-click the cFP-20*xx* controller in the left pane of FieldPoint Explorer, and select **Edit this device**.

B. Clear the factory configuration checkbox.

C. Specify the power-up settings with either of the following options:
   - If you want only the range and attribute settings you configured to be saved as power-up states, click **OK**. These settings are written to the nonvolatile memory of the controller.
   - If you want to save power-up values for the range and attribute settings and also all the current output states of the output channels, click **Snapshot**. This stores the current ranges, attributes, and output values of the bank to the nonvolatile memory of the network module. Click **OK** when you are finished.

CAUTION Using the Snapshot feature overwrites any power-up values you have specified for individual channels in the Channel Configuration dialog box.

Refer to the user manual for more information about configuring and changing the power-up values and configuring a network watchdog to guard against network failures.

Specifications

Network

Network interface . . . . . 10BaseT and 100BaseTX Ethernet
Compatibility IEEE802.3
Communication rates . . . . . 10 Mbps, 100 Mbps, auto-negotiated
Maximum cabling distance . . . . . 100 m/segment
Maximum power to connected I/O modules. . . . . 9 W
Maximum number of banks . . . . . Determined by network topology

Memory

cFP-2000 . . . . . 16 MB nonvolatile; 16 MB DRAM
cFP-2010 . . . . . 32 MB nonvolatile; 32 MB DRAM
cFP-2020 . . . . . 32 MB nonvolatile; 32 MB DRAM
Typical system usage . . . . . 5 MB nonvolatile; 8.4 MB DRAM
The operating system and embedded LabVIEW RT use approximately 5 MB of nonvolatile memory and 8.4 MB of DRAM. The remainder is available for applications.

RS-485 Isolation Voltage

Maximum isolation voltage . . . . . 100 V_{rms}
Transient overvoltage. . . . . 740 V_{rms}

Power Requirement

Power supply range . . . . . 11 to 30 VDC
Recommended power supply
  cFP-BP-4 backplane. . . . . 15 W
  cFP-BP-8 backplane. . . . . 20 W
Power consumption
  cFP-2000. . . . . 4.8 W + 1.1(Total Power Consumption of All I/O Modules)
  cFP-2010. . . . . 5.0 W + 1.1(Total Power Consumption of All I/O Modules)
  cFP-2020. . . . . 6.1 W + 1.1(Total Power Consumption of All I/O Modules)

Physical Characteristics

Screw-terminal wiring . . . . . 16–26 AWG copper conductor wire with 7 mm (0.28 in.) of insulation stripped from the end
Torque for screw terminals . . . . . 0.5–0.6 N · m (4.4–5.3 lb · in.)
Weight of cFP-20*xx* . . . . . 278 g (9.8 oz)

Environmental

FieldPoint modules are intended for indoor use only. For outdoor use, they must be installed in a suitable sealed enclosure.

Operating temperature. . . . . – 25 to 60 °C
Storage temperature . . . . . – 55 to 85 °C
Humidity . . . . . 10 to 90% RH, noncondensing
Maximum altitude . . . . . 2,000 m; at higher altitudes the isolation voltage ratings must be lowered
Pollution Degree 2

Shock and Vibration

Operating vibration
  Random (IEC 60068-2-64) . . . . . 10–500 Hz, 5 g_{rms}
  Sinusoidal (IEC 60068-2-6) . . . . . 10–500 Hz, 5 g
Operating shock (IEC 60068-2-27) . . . . . 50 g, 3 ms half sine, 18 shocks at 6 orientations; 30 g, 11 ms half sine, 18 shocks at 6 orientations

Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 3121-1
- CAN/CSA C22.2 No. 1010.1

For UL and other safety certifications, including hazardous location standards, refer to the product label or to `ni.com`.

Electromagnetic Compatibility

CE, C-Tick, and FCC Part 15 (Class A) Compliant

Emissions. . . . . EN 55011 Class A at 10 m FCC Part 15A above 1 GHz

Immunity . . . . . EN 61326-1:1997 + A1:1998, Table 1

For EMC compliance, operate this device with shielded cabling and with all cover and filler panels installed.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE Marking, as follows:

Low-Voltage Directive (safety) 73/23/EEC

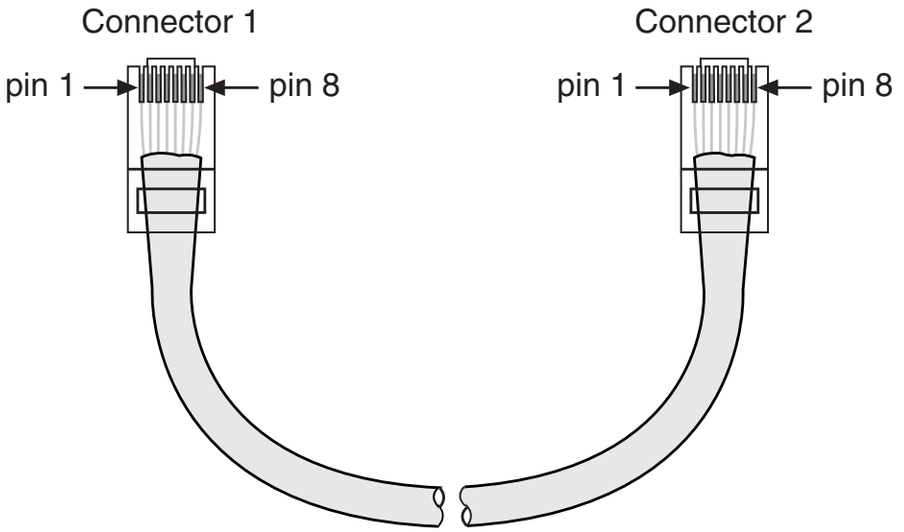
Electromagnetic Compatibility Directive (EMC) 89/336/EEC

NOTE Refer to the Declaration of Conformity (DoC) for this product for additional regulatory compliance information. To obtain the DoC for this product, click **Declarations of Conformity Information** at `ni.com/hardref.nsf/`.

Cabling

The table below shows the standard Ethernet cable wiring connections for both normal and crossover cables.

Pin	Connector 1	Connector 2 (Normal)	Connector 2 (Crossover)
1	white/orange	white/orange	white/green
2	orange	orange	green
3	white/green	white/green	white/orange
4	blue	blue	blue
5	white/blue	white/blue	white/blue
6	green	green	orange
7	white/brown	white/brown	white/brown
8	brown	brown	brown



Ethernet Cable Connector Pinouts

NATIONAL INSTRUMENTS™

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Go to ni.com/support for the most current manuals, examples, and troubleshooting information. For telephone support in the United States, create your service request at ni.com/ask and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

United States 512 683 0100
Australia 03 9879 5166, Austria 0662 45 79 90 0, Belgium 02 757 00 20, Brazil 55 11 3262 3599, Canada (Calgary) 403 274 9391, Canada (Montreal) 514 288 5722, Canada (Ottawa) 613 233 5949, Canada (Québec) 514 694 8521, Canada (Toronto) 905 785 0085, China 86 21 6555 7838, Czech Republic 02 2423 5774, Denmark 45 76 26 00, Finland 09 725 725 11, France 01 48 14 24 24, Germany 089 741 31 30, Greece 01 42 96 427, Hong Kong 2645 3186, India 91 80 4190000, Israel 03 6393737, Italy 02 413091, Japan 03 5472 2970, Korea 02 3451 3400, Malaysia 603 9596711, Mexico 001 800 010 0793, Netherlands 0348 433466, New Zealand 09 914 0488, Norway 32 27 73 00, Poland 22 3390 150, Portugal 210 311 210, Russia 095 238 7139, Singapore 65 6 226 5886, Slovenia 3 425 4200, South Africa 11 805 8197, Spain 91 640 0085, Sweden 08 587 895 00, Switzerland 056 200 51 51, Taiwan 02 2528 7227, United Kingdom 01635 523545

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